

Tracing nature's sanitation engineers

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Photo: Shantanu Kuveskar
Courtesy: wikipedia



This worksheet is
suitable for classes
7, 8 and 9.

Venturous vultures

Read the following excerpt from an article by famous environmentalist, bird watcher and author Ranjit Lal, published in *Indian Express* in October 2015*:

Way back in the Seventies, while living in Bombay (as it was then) and before any real interest in birds had taken hold, I used to rush up to the terrace of our building to watch squadrons of vultures go by, virtually at eye level, as our building was perched on top of a hill high above the city. Wave after wave, like silent bombers, they would sail past with hardly a wing beat amongst them. They were the epitome of gliding grace. In great lazy circles, they would gain more and more height and soar, wheeling languidly and making the black kites look puny and somewhat neurotic in comparison. Even here in Delhi, I would watch out for them to land on the big old trees in the Qudsia Gardens next door every evening, losing height on their approach, to touch down precisely on the branch they had chosen.

Apart from their ability to fly high (one has reportedly crashed into a plane at nearly 40,000 feet), I envied their strong stomachs. Vultures have stomachs to die for. The most unhygienic street food would turn into soothing comfort food because the acids they produce can lay low botulism, hog cholera, rabies, anthrax and virtually anything you can throw at them – or catch from the gutter. One report I read claimed that their stomach acid was about a thousand times as strong as ours (and presumably came with ultra ulcer-protection to match!) The lammergeyer or bearded vulture breaks and gobbles bones (and marrow), swallowing some pieces so large that their stomach acids begin to sizzle and dissolve the sections first reaching the stomach, even before the whole bone has got in. Nasty bacteria, including botulism toxins, hog cholera, and even rabies and anthrax stand little chance against the ferociously corrosive acid. And it's best not to startle or disturb a dining vulture for it is likely to be sick all over you - and apart from making you unfit for any company for a long while, thanks to the rancid stink, the barf will actually burn you. Not only that, but vultures also pee and poo the acrid stuff all over their own feet to sterilise them because they've been wading around knee deep in putrefying carcasses.

Why do you think the author has called vultures 'epitome of gliding grace'?

The stomach acid of vultures is reportedly a thousand times stronger than ours. What function does such a corrosive acid serve for the vultures?

Which other animals can be called scavengers apart from vultures? How are vultures different from these animals?

Vultures in the food chain

In an ecosystem, organisms are dependent on each other for their energy needs. Such a relationship of eating and being eaten is known as a food chain. A food chain has multiple levels, called trophic levels, across which transfer of energy occurs. Observe the food chain given below:



*Published with permission from author.

Do you think a linear food chain as shown above is possible in nature? Why/why not?

We know that the leopard is a top carnivore, an animal which does not have any natural predators. Observe the above food chain carefully. Has the vulture been shown as a predator of the leopard? Explain.

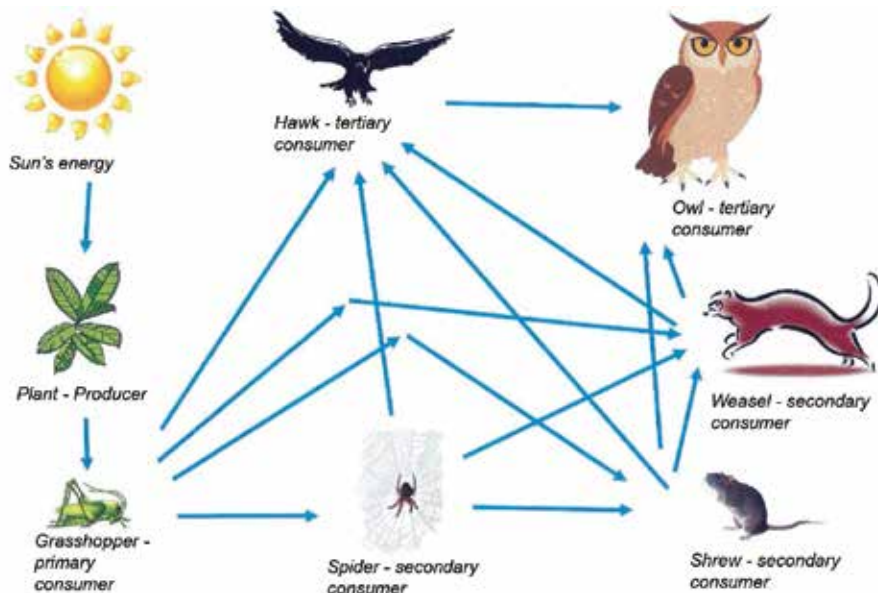
What role do vultures play in the food chain? How is it different from the role played by bacteria?

If the vulture were to be removed from the above chain, what impact do you think it would have on the ecosystem? Why?

A web of relationships

In a natural ecosystem, a linear relationship of eating and being eaten is not possible, as a single animal can be a predator of more than one animal. For instance, a tiger can prey upon deer, fox, hyena, etc. Similarly, a deer can be preyed upon by many different animals – tiger, lion, hyena, bear, coyote, etc.

Carefully observe the food web given below and count the number of relationships that each animal has with other animals in the web.



Construct a food web in a grassland ecosystem that has the following animals: lions, vultures, snakes, foxes, eagles, mice, sparrows, rabbits, owls, deers, and grasshoppers.

Scavenging in the ecosystem

A scavenger is an organism that mostly consumes decaying biomass, such as meat or rotting plant material. Many scavengers are a type of carnivore, which is an organism that eats meat. While most carnivores hunt and kill their prey, scavengers usually consume animals that have either died of natural causes or been killed by another carnivore. Scavengers are a part of the food web, a description of which organisms eat which other organisms in the wild. Organisms in the food web are grouped into trophic, or nutritional, levels. There are three trophic levels. Autotrophs, organisms that produce their own food, are the first trophic level. These include plants and algae. Herbivores, or organisms that consume plants and other autotrophs, are the second trophic level. Scavengers, other carnivores, and omnivores, organisms that consume both plants and animals, are the third trophic level.

Scavengers play an important role in the food web. They keep an ecosystem free of the bodies of dead animals, or carrion. Scavengers break down this organic material and recycle it into the ecosystem as nutrients. Vultures have many biological adaptations that make them well-suited to being scavengers. Most have excellent eyesight and a strong sense of smell. They use these keen senses to locate rotting carrion while they are soaring high over land. Unlike raptors, or birds that hunt, vultures have weak talons and beaks. Raptors use sharp talons and beaks to kill, while vultures do not need to overpower or secure their prey. Many vultures are also bald, meaning they have no feathers on their head. This prevents bits of carrion, which can carry toxic bacteria, from sticking to feathers and infecting the bird.

(Source: <https://education.nationalgeographic.org/resource/scavenger/>)

Why do you think scavengers are called “nature’s sanitation engineers”?

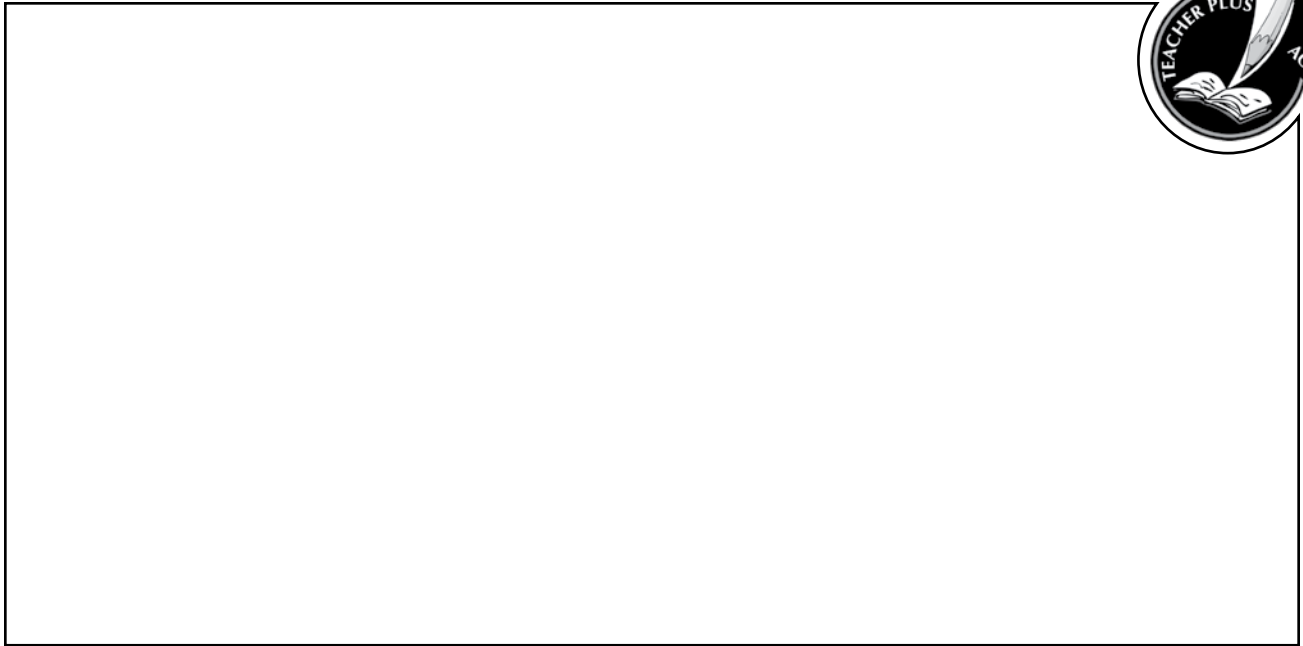
Based on the information given above, prepare a list of adaptations which will be useful for a scavenger, along with the reason behind its utility. For example, *bald head in vultures – to prevent bacteria from getting trapped in plumage and causing an infection.*

1. _____
2. _____
3. _____
4. _____
5. _____

A scavenging pet

Imagine that a vulture chick gets dropped in your home and you decide to foster it. Describe the experience of looking after a vulture chick and helping it mature in a protected environment, in the space provided on the next page.

- What name will you give it?
- What will you feed it?
- How will you manage your family’s and friends’ reactions?
- What kind of challenges are you likely to face?
- What do you think you will enjoy the most?



The enigma of vultures

Guess whether the following statements about vultures are true or false.

1. Vultures have all traits to be excellent predators. _____
2. The digestive tract of vultures can dissolve bacteria. _____
3. Vultures are extremely faithful to their partners and do not show infidelity. _____
4. If vultures eat a carcass that contains a lead bullet, they can get lead poisoning. _____
5. There are religions in the world in which the dead are fed to the vultures in a form of “sky burial”. _____
6. Vultures have blind spots in their vision. _____

Now read the following extracts for more interesting information about these enigmatic creatures:

EXTRACT 1

In 1883, eight nature-loving residents of Bombay decided to exchange notes and exhibit interesting specimens of natural history. They came together at Bombay’s Victoria and Albert Museum on September 15 and constituted the Bombay Natural History Society. A notable initiative of BNHS is **the Jatayu Restaurant** in Nepal. It aims to provide a feeding source to vultures without causing diclofenac poisoning in them. Old and dying cattle are provided a safe and comfortable place in these restaurants. Once the cattle die, they are left for the vultures to feed on.



Source: <https://naturekhabar.com>

EXTRACT 2 (written by Terry Tom Brown, published in *The Guardian* in Oct 2012)

Humans are not alone in their difficulties with monogamy. Of the nearly 5,000 species of mammals, only about 4% stay with one mate for life. Some believe the desire to couple with multiple partners stems from a biological instinct to spread genetic material. For many black vultures, infidelity is too hard to resist. When black vultures are interested in one another, they leave the flock and a chase ensues in midair. The dark, sleek creatures fly to

great heights, latch on to one another, and spiral down like acrobats in a heroic, romantic display. After mating, the females lay their eggs and both birds take on the strenuous responsibility of caring for their offspring. But for some males, the desire to be with another female is too great. The unfaithful slip away and perform similar rituals with others before returning to their life-long mate as though nothing has happened. For a male black vulture, a single indiscretion with another female comes with big consequences. When he is caught (and he does get caught), the entire flock turns on him. They ruthlessly attack the ladies' man with their sharp talons and hooked beaks. Bruised and beaten he returns to resume caring for his chicks.

How many vultures?

The 2018 census revealed that Gujarat has lost almost 70 per cent of its vulture population since 2005. The following data was published by *Times of India* on the decline of vulture population:



Why do you think a national newspaper like *Times of India* has dedicated a full article to vultures?

In which district of Gujarat has there been the greatest decline in vulture population? Explain how you arrived at your answer.

Observe the graph given above. In which period do you see the maximum decrease in the number of vultures?

Find out the status of vulture population in your city/town and reflect on the reasons which may have led to it.



The IUCN – Ringing the alarm bells

Created in 1948, the World Conservation Union (IUCN) brings together 84 States, 108 government agencies, 800 plus NGOs, and some 10,000 scientists and experts from 147 countries in a unique worldwide partnership. The Union’s mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The Union is the world’s largest environmental knowledge network and has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. The IUCN Red List of Threatened Species classifies species according to their extinction risk. It is widely recognized as the most reliable evaluation of the world’s species. It classifies them according to their extinction risk and brings into sharp focus the ongoing decline of the world’s biodiversity and the impact that mankind is having upon life on Earth.

This year the total number of birds on the IUCN Red List is 9,956 with 1,217 listed as threatened. Vultures in Africa and Asia have declined, with five species reclassified on the IUCN Red List. In Asia, the Red-headed Vulture (*Sarcogyps calvus*) moved from Near Threatened to Critically Endangered while the Egyptian Vulture (*Neophron percnopterus*) moved from Least Concern to Endangered. The rapid decline in the birds over the last eight years has been driven by the drug diclofenac, used to treat livestock. The birds’ decline has been due to a lack of food, with a reduction in wild grazing mammals, habitat loss, and collision with power lines. They have also been poisoned by carcasses deliberately laced with insecticide. The bait is intended to kill livestock predators, such as hyenas, jackals and big cats, but it also kills vultures.

(Source: iucn.org)

How do you think a union dedicated to biodiversity conservation plays a role in “equitable and ecologically sustainable” usage of natural resources?

Find out the names of animals/birds from India which are on the IUCN red list.

What is the need to classify different animals according to the extinction risk they face?

Why/When do you think species are ‘reclassified’ from one category to another?

Protecting the Earth, one carcass at a time

Vultures are an indispensable part of our ecosystem. However, there are a lot of myths that have become attached to these magnificent creatures. Many cultures consider them impure or harbingers of bad luck and so on. For example, in parts of Nepal, it is considered extremely inauspicious if a vulture is found sitting on the roof of someone's house; it is taken to mean that someone in the house is going to die. Similarly, in parts of Africa, vulture heads are used to prepare traditional medicines as well as in "black magic".

What do you think is the reason behind such superstitions? What can be a rational and effective way of dealing with them?

Despite the superstitions, the role played by vultures in our ecosystem is not limited merely to consumption of carcasses. Their presence on the planet impacts us in various other ways. In fact, vultures have an important role to play in protecting the planet.



Do you know that my presence on the planet can potentially control the emission of greenhouse gases? How do you think that happens?



In the absence of vultures, I become one of the scavengers in the ecosystem. However, I can't match the speed of vultures. When I feed on carcasses, my population also increases. This poses health risk for humans. What do you think these risks are?

Read the following excerpt and pay attention to what would happen to the ecosystem if the responsibility of disposing off animal carcasses were to fall on other animals:

"When there are no vultures, there are a zillion other things on the landscape that want to eat the carcass," says Darcy Ogada, Africa director of the Peregrine Fund, a non-profit that protects threatened and endangered birds worldwide. "But none have the ability to clean the bones the way the vultures do, so that there's not even a fly on it." A decaying carcass which isn't cleared acts as a "hub for disease transmission", where infected animals gather and spread pathogens, says Ogada. There were three times as many moments of contact between different animals at carcasses that didn't have vultures. "Hyenas and jackals are also far more likely to come into contact with humans than vultures and act as a vector for disease. By raising awareness of scavengers' ability to eliminate harmful toxins from the environment and prevent the spread of dangerous diseases in humans, however, conservationists hope to boost the recovery of these critical species. In doing so, perhaps they can help humans end our vilification of scavengers once and for all, and instead value them for the many benefits they provide us.

(Source: <https://www.bbc.com/future/article/20221206-why-we-should-value-scavengers>)

Sakshi Uniyal is a science teacher who has taught in a popular private school in Delhi as well as in a chain of central government schools. She specializes in science and inclusive education. She has been working on creating science centres that offer specialized learning opportunities to children in environment conservation. She can be reached at <sakshiuniyal1993@gmail.com>.